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ALARM SWITCH

RELATED APPLICATIONS

Not applicable.

FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

MICROFICHE APPENDIX

Not applicable.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention is concerned with the field of magnetic switches. In particular, the invention is concerned with a magnetic switch apparatus that detects relative movement between first and second members and defeats attempted external magnetic manipulation of the apparatus.

2. Description of the Prior Art

Prior art security alarm systems use magnetic switches attached to doors and windows and integrated with the system for detecting unauthorized opening indicating an intruder. One common type of magnetic switch is a so-called reed switch. This type of switch is subject to manipulation by an external magnet. That is, an intruder can use a magnet to hold the read switch closed (or open depending upon the control scheme) and thereby open a door or window without triggering the alarm system.

SUMMARY OF THE INVENTION

The present invention solves the prior art problem discussed above and provides a distinct advance in the state of the art. More particularly, the alarm switch hereof is configured to defeat attempts at external magnetic manipulation.

The preferred embodiment includes a rod-shaped, first switch element positioned transverse to and centrally aligned with a convex, second switch element and spaced therefrom. A ring-shaped first magnet is positioned about the first switch element and spaced from the second element in order to pull a ferromagnetic body into a switch-open position out of contact with the second switch element. These components are mounted to the first member such as a door frame. A second magnet mounted to the second member, such as the door, is positioned and magnetically sufficient to pull the body into a switch-closed position in contact with both of the switch elements when the members are in an adjacent position, that is, when the door is closed.

When the second member is moved to a separating position relative to the first member such as when the door is open, the second magnet is no longer effective to hold the body against both switch elements and the first magnet pulls the body out of contact with the second switch element to trigger the alarm system. Any use of an external magnet pulls the ferromagnetic body away from the centrally located first element thereby simulating an open door condition and triggering the alarm system. Other preferred aspects of the present invention are disclosed herein.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates preferred magnetic switch apparatus (shown in dashed lines) in accordance with the present invention and shown in use with a door frame and door;

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FIG. 2 is a sectional view taken along lines 2—2 of FIG. 1 and also showing an intruder magnet;

FIG. 3 is a schematic illustration of the preferred alarm system using the apparatus of FIG. 1 in accordance with the present invention; and

FIG. 4 is a top front pictorial view of the preferred magnet switch assembly of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates preferred magnetic switch apparatus 10 (dashed lines) in accordance with the present invention shown in use with a door frame 12 and door 14. FIG. 2 more clearly illustrates the details of apparatus 10 which broadly includes switch assembly 16 and operating magnet 18.

Switch assembly 16 includes first switch element 20, second switch element 22, a ferromagnetic body in the form of ball 24, retraction magnet 26 and electrically insulating upper wall 28. First switch element 20 has a generally rod-shaped configuration and presents lower end 30 and upper end 32 with flange 34 therebetween nearest upper end 32. Element 20 is preferably composed of metal to be electrically conductive.

Electrically conductive, second switch element 22 is integrally formed of sheet metal such as by stamping and includes disk-shaped bottom wall 36 presenting contact surface 38 and further includes side wall 40 circumscribing bottom wall 36. As illustrated in FIG. 2, bottom wall 36 is shaped so that contact surface 38 presents a convex configuration and in particular, a reversed, conically shaped configuration.

Upper wall 28 is preferably composed of glass (or other insulating material) and electrically insulates switch elements 20, 22 from one another. Upper wall 28 is spaced from contact surface 38 and is circumscribed by side wall 40. The outboard face of upper wall 28 is flush with the upper edge of side wall 40.

Upper wall 28 also includes central opening 42 defined therein for receiving the lower portion of first switch element 20 with flange 34 thereof engaging the outboard face of upper wall 28. This positions first switch element 20 in alignment with the axis of contact surface 38 and spaces lower end 30 from contact surface 38.

Upper wall 28, bottom wall 36 and side wall 40 define switch chamber 44 with ferromagnetic ball 24 contained therein. As will be appreciated, ball 24 is electrically conductive and can be configured in other shapes such as a cube or cylinder, although the spherical shape is preferred.

Ball 24 is shiftable within chamber 44 between a switch-open position and a switch-closed position. In the switch-open position, ball 24 is not in contact with both switch elements 20, 22. Such a position is illustrated by the dashed lines in FIG. 2 wherein ball 24 is in contact with only one of the switch elements, namely first switch element 20. The switch-open position can occur also if ball 24 shifts along contact surface 38 toward side wall 40 and out of contact with switch element 20. The switch-closed position is illustrated by the solid lines in FIG. 2 in which ball 24 is in contact with both switch elements 20, 22.

Retraction magnet 26 presents a ring-shaped configuration in the nature of a torus and is positioned adjacent the outboard face of upper wall 28 surrounding flange 34 and thereby in surrounding relationship with first switch element 20. This arrangement positions magnet 18 spaced from contact surface 38. The magnetic field strength of magnet 26